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# BARITE HILL PROJECT LONG-TERM RECLAMATION PLAN FOR THE MINERALIZED ZONE JULY 1998

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Title

1

NPDES Discharge Monitoring at Outfall 001 (Apr 95 - Apr 98)

## **FIGURES**

Number	Title
1	General Site Layout, September 1993
2	General Site Layout, Monitoring Locations
3	NPDES Discharge Monitoring at Outfall 001

## BARITE HILL PROJECT LONG-TERM RECLAMATION PLAN FOR THE MINERALIZED ZONE

### 1.0 INTRODUCTION

The Barite Hill Project is a gold mine and heap leach facility owned and operated by Nevada Goldfields Inc. The 135-acre project is located near McCormick, South Carolina and is currently being reclaimed. Areas of the site that have been reclaimed include the permanent leach pad, Area C Landfill, Rainsford Pit, Waste Disposal Area A, and the former crusher/reusable leach pad area. Areas remaining to be reclaimed include the Main Pit, leach pad solution ponds, and process area ponds. Reclamation of the site will be completed in a phased manner as the water and process solution stored in these areas are evaporated or treated and discharged.

The 22-acre crusher/reusable leach pad area, hereafter referred to as the mineralized zone, was reclaimed in mid 1995. Since that time, however, stormwater runoff monitored at Outfall 001 (see Figure 1) has periodically exhibited a depressed pH and elevated metal concentrations due to contact with sulfide-bearing soil and rock material. The sulfide material, which originates from residual crusher fines and native rock outcrops exposed by previous pad and road construction activities, has also been responsible for retarding revegetation and accelerating erosional processes in this area.

This plan was developed to address the South Carolina Department of Health and Environmental Control's (SCDHEC's) Consent Order 98-049-W requiring Nevada Goldfields Inc. to submit a plan to address long-term reclamation of the mineralized zone. The plan includes a detailed description of the activities that will be conducted to establish a substantial vegetative cover and permanently stabilize the mineralized zone. Stabilization is expected to be achieved over a 1.5 to 2.5 year period, with timing

dependent on the amount of sulfide-bearing material that will require remediation and reclamation scheduling of adjacent areas.

Sections 2 and 3 of this plan provide a history of the mineralized zone and a summary of the existing monitoring program, respectively. Section 4 reviews the intermediate reclamation plan that was implemented in March 1998 and will be maintained until the long-term reclamation plan is approved and implemented. Section 5 presents the long-term reclamation plan including a detailed schedule of implementation. Section 6 outlines the information that will be included in the additional quarterly reporting required by the Consent Order.

### 2.0 MINERALIZED ZONE HISTORY

The former crusher, reusable leach pad, and associated haul roads were constructed in fourth quarter 1990. They were situated on an east-west trending ridge line and encompassed approximately 22 acres. As shown on Figure 1, this area is located northwest of the permanent leach pad and east of the process area.

## 2.1 Mine Operations

The crusher area consisted of a crusher and agglomeration system that processed both oxide and sulfide ores mined from the Main and Rainsford Pits. Run-of-mine ore from a nearby stockpile was fed into the crusher where it was reduced to a minus one-inch size and then mixed with cement (i.e., agglomerated) to produce a product suitable for leaching. The agglomerated ore was stacked on the leach pad (initially the reusable leach pad and later the permanent leach pad) using a rubber-tired conveyor system.

The reusable leach pad covered approximately seven acres and consisted of an asphalt-lined pad surrounded by asphalt berms. Agglomerated ore was stacked on the pad to a height of approximately 30 feet and was then leached with a cyanide solution in a closed-circuit process to recover gold and silver values. After leaching, the ore was rinsed with water and transported to the clay-lined Area C Landfill for disposal.

#### 2.2 Reclamation Activities

The reusable leach pad area was reclaimed in second quarter 1995 and included excavating and placing the asphalt liner in the permanent leach pad, and harrowing and seeding of the disturbed area. Reclamation of the crusher area followed in second and third quarter 1995 and included removal of the crushing and conveying equipment, excavation and removal of residual ore, regrading and contouring to achieve more gradual slopes, and harrowing and seeding of disturbed areas. The haul road through the area was

left unreclaimed to maintain access to the reclaimed Rainsford Pit and Waste Disposal Area A.

#### 2.3 Related Reclamation Activities

The watershed for Outfall 001 also includes the reclaimed Rainsford Pit, Waste Disposal Area A, and the northern portion of the permanent leach pad (see Figure 1). The Rainsford Pit was reclaimed in late 1994 by backfilling with mine waste rock and covering with a clay and topsoil cap. The much shallower Rainsford Pit West Extension was also regraded and revegetated at this time. Waste Disposal Area A was reclaimed in the first half of 1995 by regrading its slopes and covering with a clay and topsoil cap. The permanent leach pad was reclaimed in the first half of 1996 by regrading its slopes to a uniform 3 horizontal/1 vertical angle and covering with a elay and topsoil cap. All three of these areas have exhibited good revegetation success with the exception of small, localized erosion areas.

Reclamation of the A Dam, located immediately above Outfall 001 (see Figure 1), was performed in late 1996. Prior to its reclamation, stormwater runoff mixed with treated water behind the dam before the water was discharged at Outfall 001. Discharge monitoring results for the six months prior to dam reclamation indicated low-level exceedances of the NPDES limits for copper and zinc. At the time, it was believed that the sediments that had accumulated behind the dam were contributing to these low-level exceedances. With the reclamation of the dam and discontinuation of treated water discharge in December 1996, however, the metal concentrations at Outfall 001 increased and it became apparent that the source of the exceedances was stormwater runoff. Previous mixing of the storm water with the higher pH water from the treatment plan had actually masked the true source of the elevated metal concentrations.

### 2.4 Maintenance and Repair Activities

Post-reclamation monitoring of the crusher and reusable pad area identified a number of sulfide-contaminated areas or "hot spots", primarily in the former crusher area, during the period from 1995 to 1997. In response to these findings, maintenance and repair work was conducted on three separate occasions in both 1996 and 1997. A summary of these activities follows.

Maintenance and repair work was first conducted in March 1996 when those areas exhibiting poor vegetative growth were limed, harrowed and reseeded. Additional work was conducted in June and August of 1996 when identified hot spots were excavated, backfilled with clay material, limed, harrowed and seeded. Clay was also placed on portions of the haul road to cover exposed bedrock exhibiting low-pH stormwater runoff.

After metal concentrations increased in the discharge in late 1996 and early 1997, additional maintenance work was initiated as soon as weather conditions permitted. During late winter and early spring, the reclaimed A-Dam area was amended with lime and seeded. Later in the spring, other small, localized areas exhibiting poor vegetation were also amended with lime and seeded.

After heavy hurricane-related rains in mid-1997, it became apparent that there was extensive residual sulfide-ore contamination remaining around the perimeter of the former crusher area. This perimeter contamination was excavated and replaced with clay and then the disturbed area was limed, harrowed and seeded. Excavation work began in July with reseeding completed by early October 1997. This work also included regrading and seeding of a portion of the reusable leach pad berm which had not previously been reclaimed.

### 3.0 MONITORING PROGRAM

Monitoring within the watershed of Outfall 001 consists of the following.

- NPDES monitoring of surface water discharge for flow rate and 16 chemical parameters. Semiannual biological monitoring of the receiving stream is also performed.
- 2. Field pH monitoring of stormwater runoff and soil conditions.
- 3. Visual monitoring of vegetation, erosion and soil characteristics.

The results obtained between 1995 and early 1998 for each type of monitoring are summarized below. These results provide the basis for evaluating current and future conditions at the site.

## 3.1 NPDES Monitoring

Surface water runoff from the crusher and reusable pad area drains to the west where its flow rate and quality is monitored at Outfall 001 (see Figure 2). The reclaimed Rainsford Pit, Waste Disposal Area A, and northern portion of the permanent leach pad also contribute storm water runoff to Outfall 001. NPDES monitoring at Outfall 001 was originally established to monitor any discharge of water from the process area which currently consists of a process plant, treatment plant and a series of synthetically-lined ponds. However, discharge of treated water was discontinued in December 1996. Since that time, excess process water has been eliminated through partial treatment and evaporation. Accordingly, Outfall 001 monitoring results during the past 1.5 years are attributable only to stormwater runoff.

The three most important NPDES parameters in terms of permit exceedances and evaluating site conditions are field pH, copper and zinc. Table 1 and Figure 3 provide a summary of these three parameters for April 1995 through April 1998 (i.e., the reclamation/post-reclamation period). Review of Table 1 and Figure 3 show that copper and zinc concentrations generally decreased and pH increased during the period from April 1995 to November 1996. Starting in December 1996, however, the metal concentrations in the discharge increased significantly while pH decreased. These parameters also exhibited considerable variability compared to previous data. As discussed in Section 2.3, the change in surface water quality in December 1996 is attributable to the elimination of the A Dam and discontinuation of treated water discharge.

The variability in surface water quality between December 1996 and April 1998 correlates closely with the intensity and duration of precipitation events and the implementation of maintenance and repair activities. The highest metal concentrations were reported during the winter of 1997 and 1998 and immediately after Hurricane Andrew in July 1997. These were the periods of greatest precipitation and highest stormwater runoff. The lowest metal concentrations were generally recorded after maintenance and repair activities were performed and during periods of less precipitation.

The direct correlation between elevated metal concentrations and the magnitude of stormwater runoff indicates that the highest metal concentrations in the surface water discharge occurred when the levels of the receiving stream were also high. Because of the resulting dilution, detrimental impacts to the biological health of the stream from these discharges were reduced. Macroinvertebrate surveys performed below Outfall 001 indicate that the macroinvertebrate population of the receiving stream has remained moderately impacted (Taxa richness between 20 and 30) and relatively stable (EPT Index of about 4) during the period from 1996 to 1998. The primary source of impacts to the stream appears to be downstream beaver activity rather than metal loadings. The beaver

activity began in 1995 and has since raised water levels and slowed the stream flow rate. This type of lentic habitat does not readily support EPT species.

As shown on Table 1 and Figure 3, the most recent monitoring results from April 1998 show dramatic improvement in discharge water quality at Outfall 001. The pH increased from a nominal level of between 5 and 6 standard units to over 7 standard units and copper and zinc concentrations decreased by several orders of magnitude to less than detection limits. This improvement in stormwater quality is due to the implementation of the intermediate reclamation plan in March 1998 as described in Section 4.0.

### 3.2 Field pH Monitoring

Review of the NPDES monitoring data presented in Table 1 and Figure 3 reveal a strong inverse correlation between pH and the two metals of concern (i.e., low pH values are associated with elevated concentrations of copper and zinc). This inverse correlation allows for the identification of potential discharge exceedances and source areas using a field pH meter.

Initial field monitoring in 1995 and 1996 consisted of checking the pH of surface water flows at various points throughout the reclaimed area. Areas associated with surface water pH levels between 3 and 5 standard units were identified as potential sources. These areas were then visually inspected to locate the sulfide-bearing material responsible for the exceedances. In each case, the sulfide material was subsequently excavated based on visual indications of sulfide and replaced with clay soil.

As discharge exceedances continued to occur, the field monitoring became more sophisticated. After identifying a potential source area using surface water pH levels, soil samples from the suspected area were mixed with distilled water and paste pH levels were determined for each sample. Background soils and the cover soils used in reclamation were found to have soil paste pH levels between 4.5 and 5 standard units

while sulfide-bearing areas had soil pH levels below 4.5 standard units and typically closer to 3 standard units. This methodology was successful in identifying the fine-grained, sulfide-bearing soils around the former crusher area in 1997. Paste pH measurements were also used during the excavation process to insure that these low-pH soils were completely removed prior to the placement of clay soils.

### 3.3 Visual Monitoring

Visual monitoring is performed routinely at the site and provides a quick and reliable method for identifying problematic areas. Sulfide-bearing rock is readily identified by its characteristic yellow staining. Hot spots, without obvious sulfur staining, are identified by their sparse and more yellowish vegetative stands. Inspections for erosion in constructed channels and steeper areas of the site are also performed routinely after major storm events. Timely repair of eroded areas plays an important role in stabilizing reclaimed areas and improving the water quality of stormwater runoff.

#### 4.0 INTERMEDIATE RECLAMATION PLAN

In response to continued NPDES violations for pH, copper and zinc during the 1997 - 1998 winter, Nevada Goldfields developed and implemented an intermediate reclamation plan to temporarily stabilize the mineralized zone. This intermediate reclamation plan was outlined in Nevada Goldfields' letter of March 13, 1998 to SCDHEC and included:

- 1. Harrowing of the entire area to a depth of six to eight inches.
- 2. Amending with agricultural lime until the paste pH of the soil measures 7.0 to 7.5 standard units.
- 3. Fertilizing and planting a grass seed mixture that has been successful at the site.
- 4. Irrigating the grass stands with neutralized pit water.

Items 1, 2 and 3 were completed in March and April 1998 and included excavation, removal, and regrading of the road berm in the former crusher area and reclamation of the road to the Rainsford Pit and Waste Disposal Area A. The road to the process area was limed but was left unreclaimed for continued access to the water treatment plant and solution ponds. The areas containing rock outcrops and pine trees were fertilized and seeded using hand-broadcast methods.

Irrigation of the mineralized zone will start once the pit water has been neutralized with lime to a pH between 7.0 and 8.0 standard units, as described in Nevada Goldfields March 13, 1998 letter. Application of this water will promote vegetative growth and help maintain the soil pH at near-neutral levels. The pit water will be analyzed at system startup and quarterly thereafter to verify that the water is suitable for irrigation purposes. Daily field pH measurements will also be made to insure that the water's pH remains above 7.0 standard units.

Implementation of the intermediate reclamation plan has resulted in the establishment of a good stand of vegetation in the mineralized zone. This vegetation is being moved at regular intervals to build up an organic layer over the soil. Lime is also periodically being applied to the unreclaimed road to maintain the road base material at near-neutral pH. Initial NPDES monitoring results after completion of intermediate reclamation indicated compliance with all NPDES permit limits. These results are encouraging and play an important role in formulating the long-term reclamation plan described in the next section.

#### 5.0 LONG-TERM RECLAMATION PLAN

The initial step in developing an effective long-term reclamation strategy for the mineralized zone is to characterize the source of the NPDES permit exceedances. Based on the reclamation and monitoring activities performed to date, the following three sources have been identified.

- Localized stormwater contact with sulfide material that was mined and later spread
  over the crusher and reusable leach pad surface area through crushing, hauling and
  conveying operations. This included both coarse rock and finer-grained soil and dust
  generated by the stockpiling and crushing operations. This source is believed to have
  been the primary cause of the discharge exceedances at Outfall 001.
- Localized stormwater contact with sulfide-bearing bedrock and soil material that was
  exposed during construction and reclamation activities. This source is less pervasive
  than Source 1, but is still a contributing factor to exceedances.
- 3. Area-wide stormwater contact with clay cover and background soils having a soil paste pH between 4.5 to 5.0. This source is to believed to have been a contributing factor to the discharge exceedances reported in late 1997 and early 1998 when heavy rains occurred and erosion became more evident.

Sources 1 and 2 were remediated to a large extent by the monitoring, maintenance, and repair activities conducted during 1996 and 1997. However, localized hot spots may still exist, especially along roadways and former stockpiling and crushing areas. The potential for permit exceedances to occur from Source 3 has increased over the past two years due to frequent excavation of hot-spots, loss of vegetative ground cover, and erosion caused by higher-than-normal rainfall.

Immediate, short-term improvement can be achieved in the mineralized zone through the application of agricultural lime to buffer the soil and surface water runoff. Long-term improvement, however, is contingent on:

- 1. Identifying and removing or covering any remaining high-sulfide material (i.e., hot spots) that may be present in the mineralized zone.
- 5. Amending the soils containing low levels of sulfide material with agricultural lime so that they will not require additional treatment once long-term reclamation has been completed.
  - 3. Restoring a vegetative cover and a layer of organic material over the ground surface to minimize erosion and surface water contact with the soil.

The following plan describes the reclamation activities that will be completed and an implementation schedule for achieving these three goals.

### 5.1 Hot-Spot Remediation

The initial step in implementing the long-term reclamation plan for the mineralized zone will be to conduct a comprehensive sampling and analysis program over the upper two feet of the entire area. Given the relatively low permeability of the site's clay and silt soils, any sulfide material present below two feet is expected to have little, if any, impact on revegetation and surface water runoff. The sampling and analysis program will identify hot spots requiring remediation and provide information for determining how much agricultural lime needs to be added to the remaining soils. Hot-spot remediation will consist of excavating and replacing (or covering of) high sulfide material with soil borrow material and then fertilizing and seeding the effected area.

## 5.1.1 Sampling and Analysis Program

Sampling and analysis of the upper two feet of soil in the mineralized zone will include: documenting vegetative conditions and soil type, testing of composite soil samples for acid neutralization potential (ANP) and acid generation potential (AGP), field pH testing of soil samples, and agricultural testing of surface soil samples. Samples will be collected on a grid system at a rate of one sample per revegetated acre. Additional grab samples will also be collected from rock outcrops, roadways, and soil borrow areas in sufficient numbers to adequately characterize these areas.

<u>Sample Location</u> - The sample grid will be layed out with a transit (or Brunton Compass) and a tape measure in a manner that will provide representative coverage of each area of the mineralized zone. All sample locations will be marked with wooden stakes and assigned a location number. Additional sample locations will be staked at rock outcrops and along roadways to characterize these unvegetated areas, and within the clay and topsoil borrow areas to characterize the soil cover material.

Sample Collection and Documentation - The type and condition of the vegetation at each location will be recorded and each soil sample will be classified according to the Unified Soil Classification System. Samples will be collected at each location using a shovel and trowel or, in the case of rock outcrops, a rock hammer. The samples will be placed in plastic ziplock bags, labeled with permanent marker, and transported in chilled coolers.

ANP/AGP Samples - One 500 gram composite sample will be collected for ANP/AGP w/ Surface testing from the ground surface (1/3<sup>rd</sup> of sample), one-foot deep (1/3<sup>rd</sup> of sample), and two-feet deep (1/3<sup>rd</sup> of sample) at each location. The samples will be tested to determine their ANP in tons of calcium carbonate per 1,000 tons of soil and their AGP in tons of calcium carbonate required to neutralize the pyritic sulfur content in 1,000 tons of soil. Sample test results are semi-quantitative in nature because neutralization and generation of

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acid are dependent on the soil's physical characteristics and climatic factors in addition to the soil's chemical composition. For the purposes of the sampling and analysis program, samples with ANP significantly greater than AGP will be assumed to be non-acid generating while samples with significantly greater AGP than ANP will be assumed to be acid generating and representative of potential hot spots. Samples with ANP and AGP of similar magnitude will be assumed to be capable of supporting vegetation but may require the application of agricultural lime.

If soil pH testing (see below) identifies a sample location as having a low pH, additional composite samples will be collected for ANP/AGP testing from the surrounding area. In revegetated areas, additional sampling will be performed at a rate of one sample per quarter acre. In rock outcrops and road areas, additional samples will be collected, as necessary, to more accurately define the high-sulfide zone. For example, a small rock outcrop of uniform color and composition may not need any additional sampling while a road may need in-fill sampling on tighter centers when low pH material is present. For quality control purposes, three duplicate composite samples will also be prepared and tested for ANP/AGP.

<u>Paste pH Samples</u> - Approximately 200 grams of soil will be collected from each soil horizon (i.e., surface, one-foot deep, and two-feet deep) at each location and labeled according to depth and location. A portion of each of these soil samples will be tested at the site for soil pH by mixing the soil on a 1:1 (volume/volume) basis with distilled water and measuring the resultant solution with a field pH meter. The pH will be recorded and the remainder of the sample will be stored at the site for 90 days in the event that any retests are needed.

Agricultural Test Samples - Approximately 500 to 1,000 grams of soil will be collected from the surface at each location for standard soil testing at Clemson University including: soil pH; buffer pH; plant-available phosphorus, potassium, calcium, magnesium, zinc, manganese, copper, and boron; cation exchange capacity; acidity; and

percent base saturation (calcium, magnesium, potassium, sodium, and total). Of these tests, the buffer pH is the most critical for the mineralized zone because it is used to estimate the total acidity that needs to be neutralized to raise the pH of the soil to the desired level of between 7.0 and 7.5 standard units.

## 5.1.2 Delineation and Removal of Hot Spots

The data collected from the sampling and analysis program will be used to develop hotspot maps of the mineral zone. Hot spots will be identified by a low ANP/AGP ratio, low paste pH levels, and low buffering capacity. Delineated hot spots will be excavated to a depth of two feet and replaced with clay soil or topsoil or, alternately, covered in place with two feet of clay soil or topsoil from on-site borrow areas. Paste pH levels will be measured and documented during excavation to verify that each hot spot has been fully remediated.

The choice between excavation/replacement and covering will be dependent on the lateral extent of each hot spot and topographic and drainage considerations. Clay borrow soil will generally be preferred to topsoil because a clay borrow area already exists on site and no new surface disturbances would be required to supply the clay. However, placement of topsoil may be necessary in critical areas where revegetation is difficult such as steep hillsides and areas with minimal soil depth. Topsoil would be obtained by stripping a perimeter area of the site that is contiguous with existing surface disturbances.

Once the hot spots have been removed or covered, the effected area will be amended and fertilized in accordance with Clemson University recommendations and reseeded. The road will also be amended with lime, but will not be reclaimed until access to the treatment plant is no longer needed on a daily basis.

#### 5.2 Lime Treatment

Based on the monitoring performed to date, the majority of the surface soils in the mineralized zone are slightly to moderately acid generating and will require treatment with lime to attain optimum conditions for vegetative growth. Lime treatment will also help to buffer stormwater runoff during the initial reclamation period when ground cover is still minimal.

Nevada Goldfields plans to sample and perform standard agricultural tests on the surface soils in the mineralized zone on a semiannual basis and, based on the test results, amend the soil to achieve a soil pH between 7.0 and 7.5. This level of soil treatment is substantially greater than the typical agricultural practice of amending the soil every two to three years to achieve a soil pH of approximately 6.5. Lime-will also be applied to the roads on a periodic basis when field pH monitoring of the road base material and stormwater runoff indicates that the previous lime application has washed away. Agricultural soil testing and lime treatment of the mineralized zone will be discontinued after the fall of 1999 provided that the vegetative and organic ground cover is well established.

#### 5.3 Revegetation

Establishment of a good vegetative cover with a thick organic layer over the surface of the mineralized zone will promote infiltration of precipitation (i.e., reduce runoff volume) and minimize contact of stormwater runoff with the site's low-pH soils (i.e., minimize leaching of metals from the soils). Remediation of hot spots and lime treatment of the mineralized zone will establish the soil conditions necessary to restore the natural ground cover. Revegetation will be further enhanced by the implementation of the following standard agricultural practices.

Mowing - The vegetative stands will be mowed on a routine basis during the summer months once they reach a height of approximately four inches. This practice will help to build up the surface organic layer of the reclaimed area. As the fall planting season approaches, mowing will be discontinued and the grasses will be allowed to go to seed.

<u>Irrigating</u> - The reseeded areas will be irrigated with neutralized pit water during the summer and early fall months to accelerate vegetative growth. The irrigation water will be maintained between a pH of 7 and 8 standard units and will be applied at a nominal rate of three inches per week. The application rate will be reduced if irrigation generates runoff and the irrigation system will be shut off during and after storm events.

<u>Erosion Control</u> - The mineralized zone will be routinely inspected and identified erosion will be repaired and reseeded as soon as practical but no later than the next planting season. Areas experiencing chronic erosion problems will be repaired by directing the surface drainage away from the eroded area and/or reinforcing the eroded area with straw mulch, erosion control matting, riprap, or other suitable material.

Applying Fertilizer and Mulch - Fertilizer will be applied in the fall and spring in accordance with Clemson University's recommendations. A straw mulch may also be disked into the soil at a rate of 0.5 to 1.0 ton per acre if the organic layer requires augmentation.

<u>Planting of Pine Trees</u> - Once the vegetative stands are fully established and self-sustaining, approximately 150 to 200 saplings will be planted along the former ridge line where the soils are relatively thin and rocky. Pine trees are well adapted to thin, acidic soils and will help restore the ridge line to its pre-mining condition.

As the remaining solution in the process ponds is evaporated and/or treated and discharged, the process ponds will be reclaimed in accordance with the approved reclamation plan. All structures will be removed except for the water treatment building

and one small process pond, which will remain as a backup treatment system to the biotreatment system to be installed south of the permanent leach pad. Once the process ponds have been reclaimed and structures removed, the road to the water treatment building will be reclaimed by ripping, seeding, and fertilizing. Although traffic over the reclaimed road will be discouraged, it is expected that periodic use of the road for monitoring and inspection purposes will ultimately result in a two-track configuration.

### 5.4 Implementation Schedule

The long-term reclamation plan is designed to achieve a good vegetative cover and reduce metal concentrations in the surface water runoff to background levels in two to three growing seasons (i.e., by the fall of 1999 or 2000). Nevada Goldfields plans to complete the majority of the remaining reclamation work at the site during this same time period. A fast-track implementation schedule for completing the long term reclamation of the mineralized zone over 1.5 years is provided below. If hot-spot remediation is extensive or associated reclamation work is delayed, this implementation schedule will be extended by an additional one-half to one year.

## 3rd Ouarter 1998

- Mow and irrigate vegetative stands
- Apply lime to access road
- Complete Sampling and Analysis Program

## 4th Quarter 1998

- Remediate hot spots
- Repair eroded areas
- Amend soil in accordance with soil analyses
- Apply straw mulch if warranted

· Apply lime to access road

## 1st Quarter 1999

- · Apply lime to access road
- Perform sampling and agricultural analyses

## 2<sup>nd</sup> Quarter 1999

- Repair Eroded Areas
- Amend soil in accordance with soil analyses
- Mow and irrigate vegetative stands
- · Apply lime to access road

## 3<sup>rd</sup> Quarter 1999

- Mow and irrigate vegetative stands
- · Apply lime to access road
- Perform sampling and agricultural analyses

## 4th Quarter 1999

- · Repair eroded areas
- Amend soil in accordance with soil analyses
- Plant pine trees
- Reclaim access road

### 6.0 COMPLIANCE MONITORING AND REPORTING

Monitoring of Outfall 001 and the mineralized zone will remain consistent with previous and current practice. Sampling and analyses will be performed of surface water discharge on a routine basis in accordance with NPDES permit requirements. Field pH measurements of both water and soil and visual observation will also continue to play an important role in identifying and correcting potential problems at an early stage.

Beginning July 1, 1998, Nevada Goldfields will submit two copies of a quarterly progress report to SCDHEC describing the current status of the mineralized zone, reclamation activities completed during the quarter, and NPDES monitoring results for pH, copper and zinc. The following information will also be included.

- 1. The October 1, 1998 report will include a document summarizing the results of the sampling and analysis program described in Section 5.1.1.
- 2. The January 1, 1998 report will include a summary of the hot spot remediation described in Section 5.1.2.
- 3. Daily field pH measurements and quarterly water analyses will be provided for the neutralized pit water when the irrigation system is in operation.

Quarterly reporting will continue until SCDHEC approves final close out of the Consent Order.

Nevada Goldfields believes that this plan will provide for long-term stabilization of the mineralized zone over a 1.5 to 2.5 year period and a gradual reduction in the magnitude and frequency of NPDES permit limit exceedances for pH, copper and zinc. The ultimate objective of the plan will be to meet all NPDES permit limits for stormwater discharge at Outfall 001. If the plan does not result in significant improvement in stormwater quality,

Nevada Goldfields will reevaluate site conditions and propose additional mitigation measures.

Given the highly mineralized nature of the Barite Hill Project site, the lowest achievable background level for copper may be higher than the current NPDES permit limits of 0.02035 mg/l (average) and 0.02871 mg/l (daily maximum). Background levels were not established for stormwater prior to the start of mine operations because the primary intent of the permit was to monitor the discharge of treated process water. However, monitoring data collected from former Outfall 003 which monitored surface water discharge from the reclaimed Permanent Leach Pad and Area C Landfill indicates that background copper concentrations between 0.06 and 0.07 mg/l may be appropriate for the site. The vegetative cover in the area draining to Outfall 003 is in good condition with minimal erosion.

Dec-97 Jan-98	Oct-97 Nov-97	Sep-97	Jul-97	Apr-97	Mar-97	Feb-97	Jan-97	Dec-96	Nov-96	Oct-96	Sep-96	Aug-96	Jul-96	Jun-96	May-96	Apr-96	Mar-96	Feb-96	Jan-96	Dec-95	Nov-95	Oct-95	Sep-95	Aug-95	Jul-95	Jun-95	Apr-95	Mar-95	Feb-95	Jan-95	Dec-94	Nov-94	Oct-94	Sep-94	Aug-94	Jul-94	Jun-94	May-94	Apr-94	Feb-94	Jan-94	Date	Date
5.17 5.93	5.31	4.07	<u>ယ</u> ယ	7.59	6.12	4.9	4	<b>₽</b> 3	7.1	6.2	6	6.2	တ	6 	6.2	7.3	6	5.8	6.1	5.7	5.6	υ ω	ტ. ტ.	6.3 8	6.3	6.02	6.1	5. <b>4</b>	5.4	ე	<u>ල</u>	7.2	6.95	ნ.5	4.5	3.9	7.4	6.86	6.93	6. <b>8</b>	7.2	7	ī.
1.22 0.464	1.43	1.32	2.8	0,066	0.524	<u>.</u>	1.2 2	1.27	0.025	0.065	0.032	0.052	0.097	0.0987	0.092	0.13	0.147	0.177	0.452	0.642	0.659	0.758	0.864	0.996	0.306	0.614	0.474	0.818	1.76	1.737	0.323	0.085	0.102	0.159	2	15.68	0.435	0.033	0.185	0.036	0.031	ć	2
0.128 0.129	0.045	0.227	0.408	0.029	0.111	0.19	0.28	0.34	0.023	0.05	0.042	0.062	0.076	0.073	0.066	0	0.074	0.077	0.151	0.17	0.177	0.168	0.158	0.193	0.135	0.169	0.498	0.256	0.372	0.3	0.074	0.021	0	0.023	0.142	1.13	0	0	0.022	0	0		7n
0.115 0	00	0	0	0	0	0	0	0	0	0	0	0	0	Ó	0	0.021	0	0	0	0	0	O	0	0	0	0	0.008	0.008	0.007	0.017	0.054	0.062	0.044	0.117	0.029	0.026	0	0.007	0.049	0	0	ç	N N
0.0289	0.0796	0.0289	0.0289	0.0001	0.0001	0.228	0.1438	0.0039	0.0014	0.005	0.0045	0.0051	0.005	0.0289	0.0289	0,0009	0.0327	0.0338	0.0193	0.0319	0.015	0.026	0.0796	0.0118	0.0005	0.04	0.00011	0.1152	0.0907	0.0683	0.0517	0.1251	0.1136	0.0484	0.0886	0.0524	0.0001	0.0009	0.00196	0.0012	0.0002	- 10	Flow

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Table 1

## Barite Hill Project - Outfall 001

Date	рН	Cu	Zn	Se	Flow
Feb-98	4.47	0.645	0.11	0.013	0.0051
Apr-98	7.72	0	0.011	0	0.0009
Jun-98	7.81	0	0.045	0.01	0.0029

Table 1 Page 2

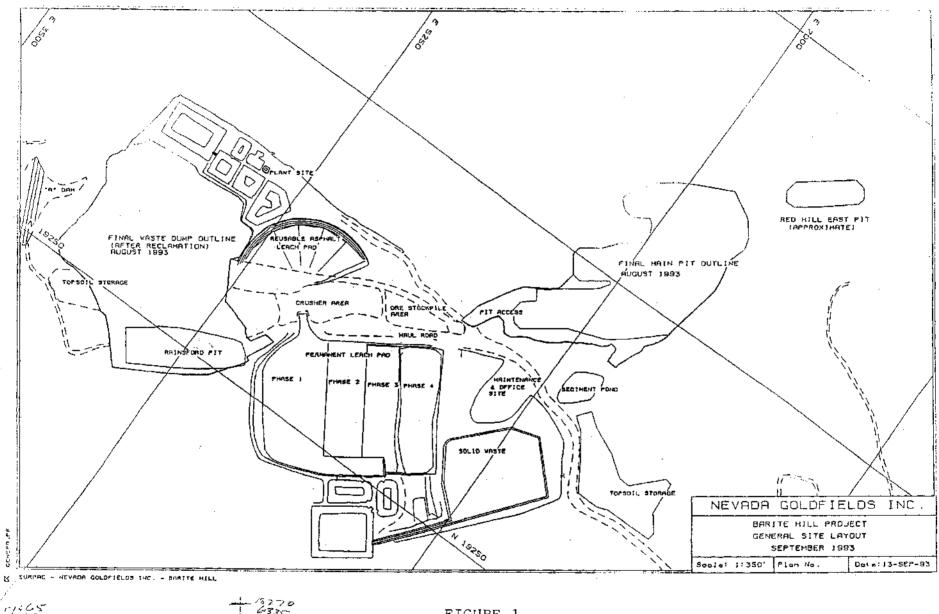


FIGURE 1

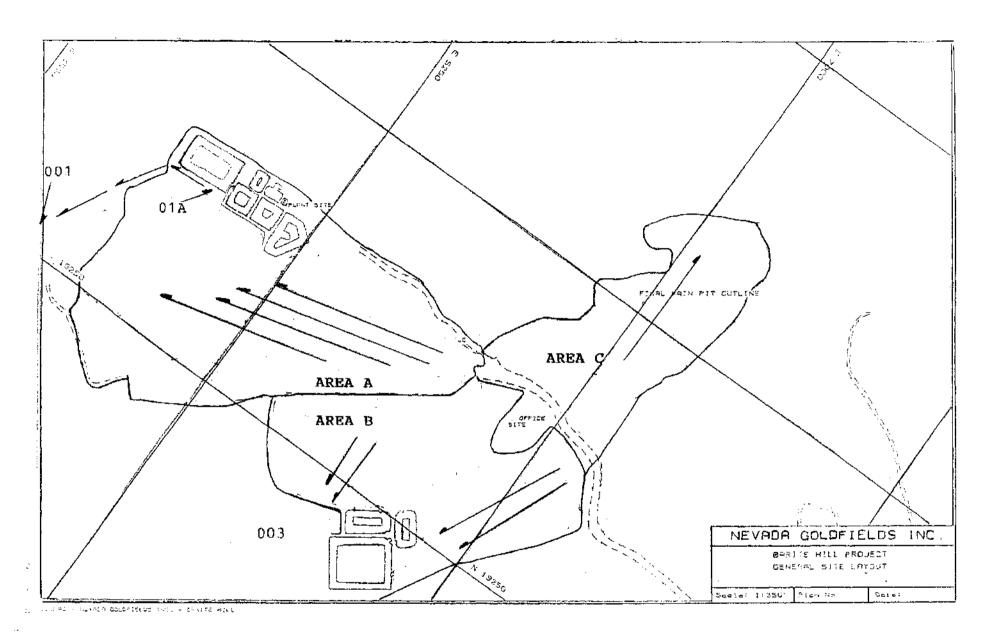


FIGURE 2

## Barite Hill Project - Outfall 001

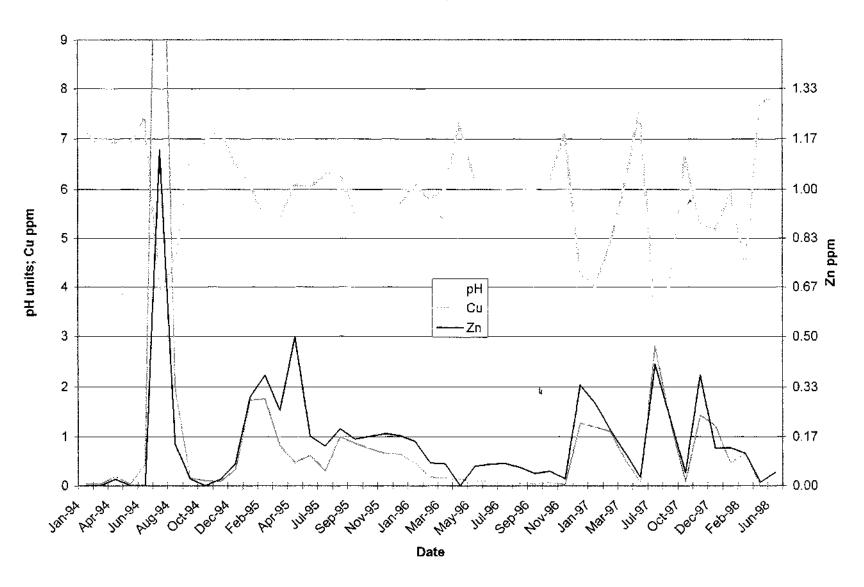


Figure 3

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